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Claims

[c1] What is claimed is:

1. A method of forming a hole in a board, comprising the steps of:

(a)irradiating a laser beam on a surface of said board from a direction perpendicular thereto to thereby drill a hole in said board;

(b)irradiating a laser beam onto said hole from a direction inclined at a predetermined angle relative to said perpendicular direction; and

(c)repeating the step (b) until diameters of a top portion and a bottom portion of said hole become substantially equal to each other.

[c2] 2. The method according to claim 1, wherein said predetermined angle is selected within the range of from about 2 to 5 degrees measured from a perpendicular direction relative to said board.

[c3] 3. A method of forming a plurality of holes in a board, comprising the steps of:

(a)irradiating a laser beam on a surface of said board from a direction perpendicular thereto in a plurality of predetermined positions thereof in turn to thereby drill a

plurality of holes in said board;
(b)irradiating a laser beam onto the holes drilled in said plurality of predetermined positions in turn from a direction inclined at a predetermined angle relative to said perpendicular direction; and
(c)repeating the step (b) until diameters of a top portion and a bottom portion of each of said holes become substantially equal to each other.

[c4] 4. The method according to claim 3, wherein said predetermined angle is selected within the range of from about 2 to 5 degrees measured from a perpendicular direction relative to said board.

[c5] 5. The method according to claim 4, wherein the step (c) repeating the step (b) includes a step of irradiating a laser beam while changing a laser beam irradiation position along a circumferential direction of each of said holes.

[c6] 6. A method of forming a plurality of holes in a board, comprising the steps of:
(a)irradiating a laser beam on a surface of said board from a direction inclined at a predetermined angle relative to a direction perpendicular to the surface of said board, in a plurality of predetermined positions of said board in turn to thereby drill a plurality of holes in said

board; and

(b)repeating the step (a) until diameters of a top portion and a bottom portion of each of said holes become substantially equal to each other.

[c7] 7. The method according to claim 6, wherein said predetermined angle is selected within the range of from about 2 to 5 degrees measured from a perpendicular direction relative to said board.

[c8] 8. The method according to claim 7, wherein the step (b) repeating the step (a) includes a step of irradiating a laser beam while changing a laser beam irradiation position along a circumferential direction of each of said holes.

[c9] 9. A hole drilling apparatus comprising:

an oscillator producing a laser beam for drilling a hole in a board;

a lens through which the laser beam passes and which determines an angle of the laser beam relative to said board depending on a laser beam passing position of said lens;

a mirror changing the laser beam passing position of said lens depending on the number of times of laser beam irradiation to said board;

a mask having the ability to change the diameter of the

laser beam; and

a moveable stage to which the board is coupled having the capability to adjust the position of the board with respect to the laser beam.

[c10] 10. The hole drilling apparatus according to claim 9, wherein an angle of said mirror is adjustable for changing the laser beam passing position of said lens.